REMARKS

Claims 1-21 are pending, with claims 1 and 17 being in independent form.

At the outset, the Applicant acknowledges with appreciation the Office's withdrawal of the finality of the prior Office Action and the indication of allowable subject matter.

In this Office Action, claims 1-8, 10-14, 16-18, and 20-21 stand rejected as being either anticipated or obvious in view U.S. Patent No. 6,403,203 to Futamoto et al. ("Futamoto"). The Applicant believes the pending claims are allowable over the cited document for the following reasons.

Anticipation requires that every feature of the claimed invention be shown in a single prior document. *In re Paulsen*, 30 F.3d 1475 (Fed. Cir. 1994); *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999). The pending claims positively recite features that are not described in the cited document.

For example, claim 1 recites, among other things, "a crystal growth discontinuation layer between the perpendicular orientation promoting underlayer and the perpendicular magnetic recording layer for suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer". The Office contends that this feature reads on Futamoto's soft magnetic layer 42 formed of NiFe included in the arrangement shown in FIG. 6. The Office admits that Futamoto does not disclose that the NiFe soft magnetic layer 42 serves to interrupt crystal grain growth from the underlayer to the perpendicular recording layer, as the claim recites. But the Office contends that Futamoto's NiFe layer 42 inherently satisfies the absent limitation by virtue of the fact that the Applicant claims the use of NiFe for this layer. The Applicant respectfully disagrees.

The initial burden of proof in showing inherency lies with the Patent Office. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

The Applicant describes at page 4, lines 25-28 of the specification, and persons skilled in the art would understand, that the material chosen for the crystal

growth discontinuation layer can be appropriately selected to provide for a crystal growth discontinuation effect depending on the materials used for the perpendicular orientation promoting underlayer and the PMR layer. Thus, while the Applicant may claim that the crystal growth discontinuation layer can be formed of permalloy (or NiFe), whether such permalloy layer can provide for a crystal growth discontinuation effect, as claim 1 recites, depends on the materials chosen for the perpendicular orientation promoting underlayer and the PMR layer. NiFe may or may not provide for the required crystal growth discontinuation effect depending on the compositions of these other layers.

For example, the Applicant describes in Comparative Example 2 on page 6 of the application an arrangement in which a NiFe soft magnetic layer is arranged between a Ti underlayer and a CoCr alloy perpendicular magnetic recording (PMR) layer. The Applicant describes that the arrangement results in a conventional pseudo double-layer PMR disk, i.e., a disk having continuous crystal growth from the underlayer to its PMR layer. The Applicant describes in the Background section of the application that in a conventional PMR medium, an underlayer is disposed below a PMR layer to promote perpendicular magnetic orientation of the PMR layer, and that the crystal growth in the underlayer is continuous to the PMR layer in an aligned grain structure. *See*, p. 2, ll. 10-14.

The conventional Ti-NiFe-CoCr alloy arrangement described in Comparative Example 2 is the same as Futamoto's arrangement shown in FIG. 6 that is relied on by the Office to support the rejection of claim 1. In FIGS. 5-7 of the application, the Applicant compares the performance of a PMR disk having this conventional, continuous-aligned grain structure, Ti-NiFe-CoCr alloy arrangement with a PMR disk of the type described in Example 1 on page 5 of the specification. The arrangement of Example 1 includes a Ti crystal growth discontinuation layer arranged between a Pt underlayer and a CoCr alloy PMR layer.

Based on the above, the Applicant clearly describes in the specification that NiFe is not an appropriate material to provide for a crystal growth discontinuation effect when Ti is used for the perpendicular orientation promoting underlayer and when a CoCr alloy is used for the PMR layer. Indeed, the Applicant uses the Ti-NiFe-CoCr alloy arrangement as a comparative example to show the effects of

having the crystal growth in the underlayer be continuous to the PMR layer in an aligned grain structure.

Accordingly, the Applicant's mere claiming of the use of NiFe for the crystal growth discontinuation layer does not inherently satisfy the absent limitation of suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer as the Office asserts. Instead, the Applicant's specification makes clear that the crystal growth discontinuation material must be appropriately selected based on the materials used for the perpendicular orientation promoting underlayer and the PMR layer, and that NiFe is an inappropriate crystal growth discontinuation material when Ti and a CoCr alloy are used for these respective layers. Thus claim 1 is believed to be allowable over the cited document for at least this reason.

Further evidence that Futamoto's NiFe layer does not suppress continuous crystal growth from the underlayer to the perpendicular magnetic recording layer lies in the described thickness of the layer. Futamoto describes that the soft magnetic layer 42 of Fe--Ni film is 30 nm thick. *See*, col. 14, ll. 5-6. But the Applicant describes that it is preferably that the crystal growth discontinuation layer has a thickness of 20 nm or less to allow transfer of the perpendicular magnetic orientation property of the underlayer to the PMR layer. Page 4, ll. 30-32. The Applicant further describes that if the thickness of the crystal growth discontinuation layer is greater than 20 nm, the perpendicular magnetic orientation effect from the underlayer cannot be exerted on the PMR layer. *Id.* at ll. 32-34. Futamoto's NiFe layer can be thicker because it does not suppress continuous crystal growth from the Ti underlayer to its CoCr PMR layer. Accordingly, claim 1 is believed to be allowable over the cited document for this reason as well.

The Office also contends that U.S. Patent No. 6,495,252 to Richter et al. ("Richter") evidences at col. 4, ll. 55-60, that it is known in the art that soft magnetic underlayers, such as Futamoto's NiFe layer 42, serve to interrupt grain growth. The cited passage appears to state that conventional magnetically soft underlayers interrupt grain growth, which the Office is relying on to show the inherency of the admitted absent limitation of suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer. But the statement relied on by Office pertains to a magnetically soft underlayer used in a conventional

perpendicular recording system without an underlayer for controlling the grain size of the PMR layer.

For example, the passage relied on by the Office refers to Richter's conventional recording system 10 shown in FIG. 1. The recording system 10 includes a substrate 2, a soft magnetic underlayer 3, e.g., of NiFe, and a PMR layer 4. Importantly, Richter's conventional arrangement includes no underlayer equivalent to Futamoto's Ti underlayer 12 that is arranged between the soft magnetic underlayer 3 and the substrate 2. As discussed above, whether or not a layer provides for a crystal growth discontinuation effect depends on the materials chosen for the surrounding perpendicular orientation promoting underlayer and PMR layer. Since Richter's conventional recording system 10 has no such underlayer, the Office cannot rely on Richter's statement to show that Futamoto's soft magnetic layer 42 is a crystal growth discontinuation layer.

In the cited passage, Richter states that "whereas conventional magnetic media utilize underlayers for controlling the grain size of magnetic layer 4, the magnetically soft superparamagnetic underlayer of the present invention does not interrupt grain growth, as is inevitably the case with conventional magnetically soft underlayers" (emphasis added). In other words, Richter states that without an underlayer for controlling the grain size of the PMR layer, a conventional magnetically soft underlayer can interrupt grain growth. But the Applicant's arrangement defined by claim 1 includes such an underlayer. *See, e.g.*, layer 22.

Indeed, Richter describes, in conjunction with the embodiment shown in FIG. 2, a medium 20 that includes such an underlayer 3. Richter describes that the underlayer 3 is typically comprised of Cr or a Cr--based alloy, such as Cr--V or Cr--Ti. Col. 5, ll. 54-56. Richter further describes that the magnetic layer 4 is typically comprised of a Co-based alloy including Cr. *Id.* at ll. 56-59. Richter then describes the arrangement of a magnetically soft superparamagnetic layer 8A comprising ferromagnetic or ferrimagnetic material selected from Fe, Fe-rich alloys, such as NiFe, and Fe-oxides. *Id.* at ll. 61-64. Richter describes that the width of the grains constituting the layer stack of medium 20 is substantially the same, i.e., each overlying layer replicates the grain width of the underlying layer. *Id.* at ll. 37-41.

Based on the above, Richter describes a CrTi-NiFe-CoCr alloy arrangement having a continuous grain structure between the underlayer and PMR layer, much

like the similar arrangements shown in Futamoto and described by the Applicant in Comparative Example 2 on page 6 of the application. Thus, Richter further affirms that a soft magnetic layer arranged between a Ti-based underlayer and a CoCr alloy PMR layer promotes crystalline alignment between the layers rather than suppresses continuous crystal growth from the underlayer to the PMR layer, as the Office asserts. Accordingly, claim 1 is believed not to be anticipated by Futamoto for this reason as well.

For the foregoing reasons, the Applicant respectfully asserts that the Office has failed carry its initial burden of showing the admitted absent feature of claim 1 of a crystal growth discontinuation layer for suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer is inherent, and that claim 1 is not anticipated by Futamoto.

Moreover, the Office has failed to prove its prima facie case of obviousness based on Futamoto. Futamoto's arrangement is precisely the arrangement understood by the Applicant and described in Comparative Example 2 as promoting crystalline alignment between the underlayer and PMR layer. As discussed above, Richter confirms the desire to use an arrangement of an Ti-based underlayer, a NiFe soft magnetic layer, and a CoCr PMR layer, similar to Futamoto's arrangement of FIG. 6, to promote crystalline alignment between the underlayer and PMR layer.

Accordingly, persons skilled in the art would not be motivated to modify Futamoto's arrangement to provide for the admittedly absent crystal growth discontinuation layer between the perpendicular orientation promoting underlayer and the perpendicular magnetic recording layer for suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer, as claim 1 recites. Thus, the Applicant believes claim 1 is not obvious in view of Futamoto as well.

Regarding claim 17, this claim recites subject matter that is similar to claim 1, and is believed to be allowable for the same reasons put forth above. In addition, the remaining claims that depend from either claim 1 or claim 17 are believed to be allowable for at least these same reasons.

It is believed this application is in condition for allowance and an early Notice thereof is earnestly solicited. If any questions remain, the Examiner is invited to phone the undersigned at the below-listed number.

Respectfully submitted,

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